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FLORENCE/ HEATH ST.
TRAFFIC ANALYSIS
NEWTON - BROOKLINE

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FINAL REPORT

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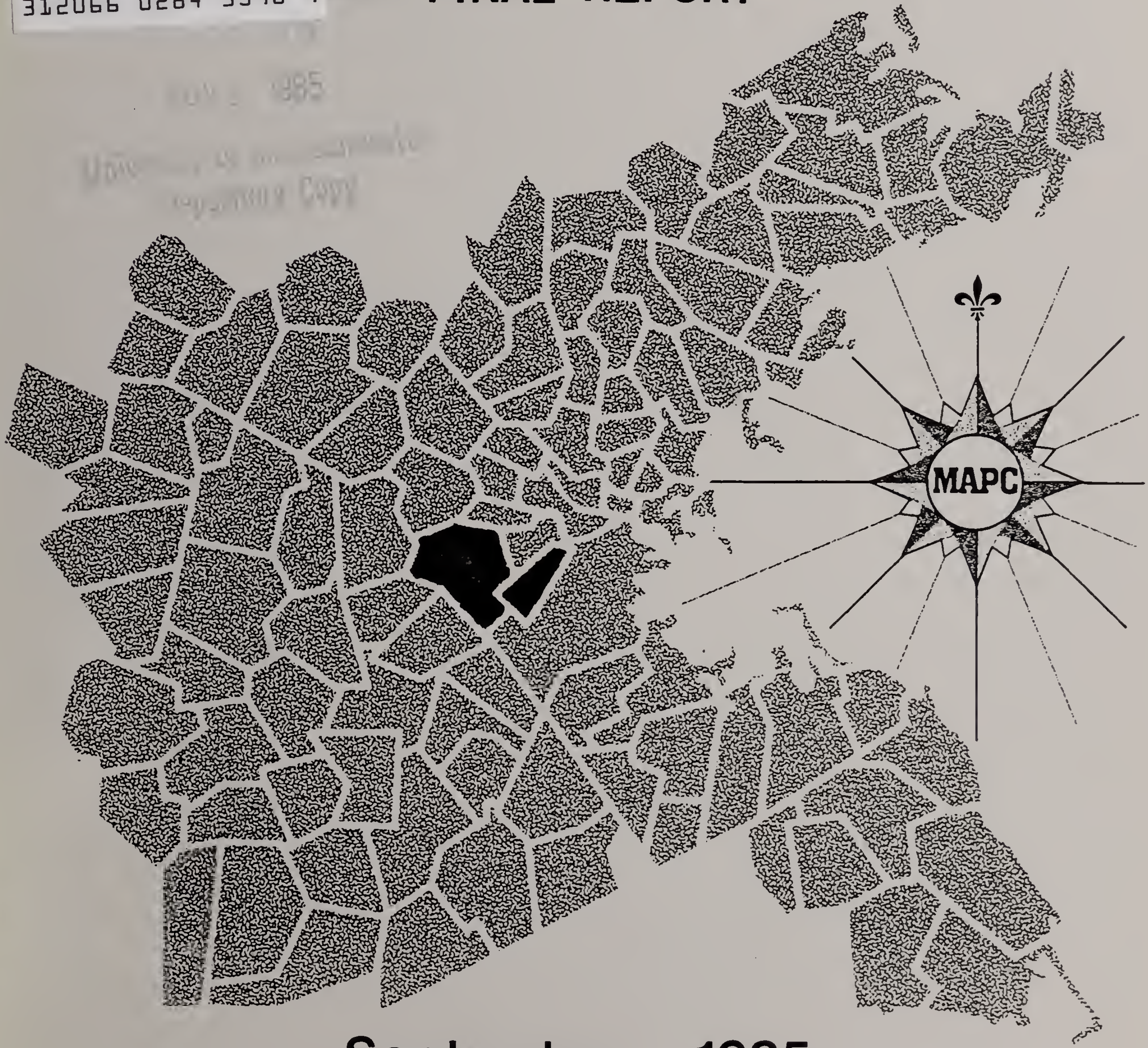

September 1985

Metropolitan Area Planning Council

110 Tremont Street Boston, Massachusetts 02108

Analysis of Traffic Problems
on
Florence and Heath Streets
in
Newton and Brookline

Metropolitan Area Planning Council

September, 1985

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Project Manager
Andrew McClurg, Transportation Planner

Typing
Cindy Wilson

Cover
David Lewis

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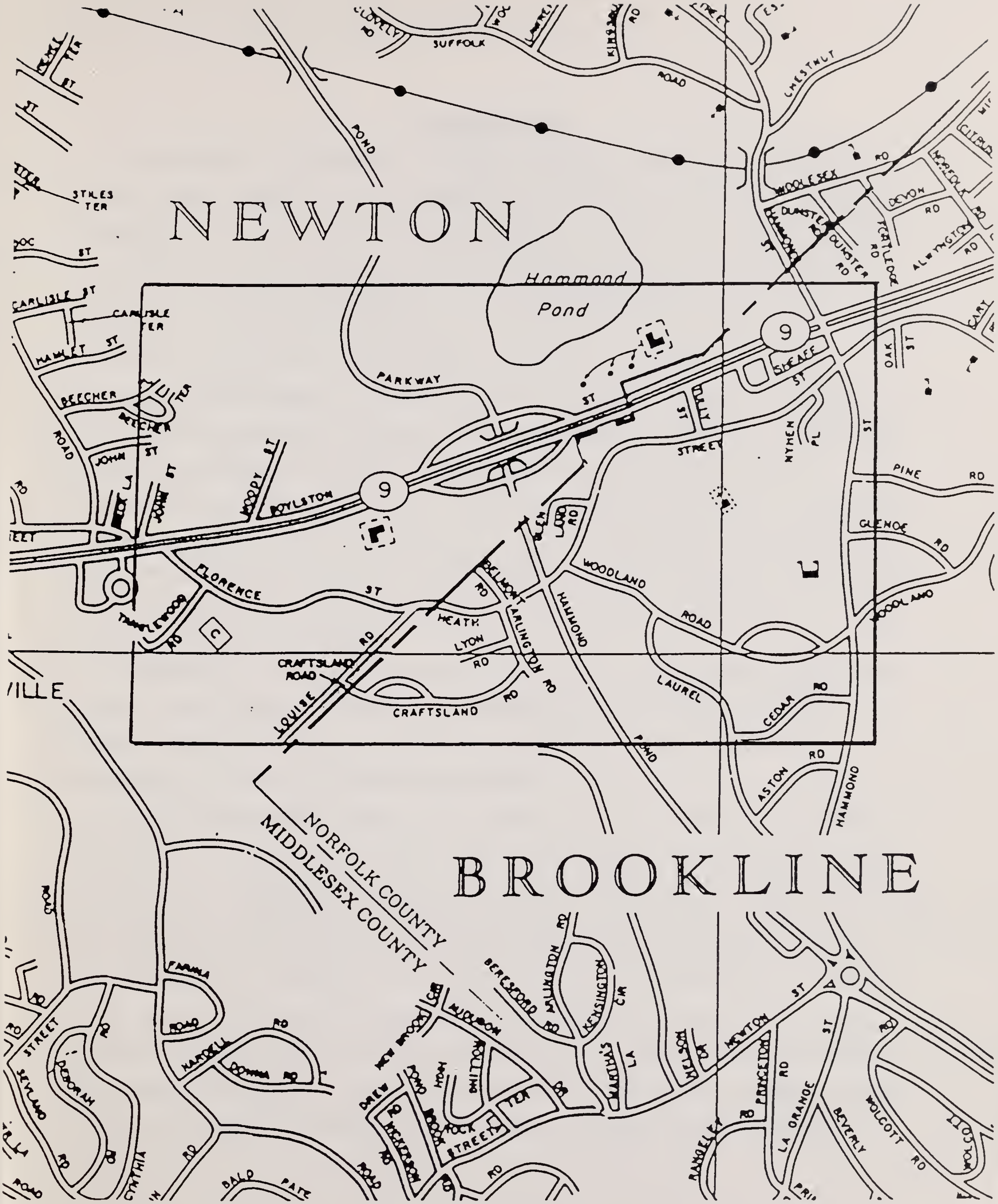
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BEVERLY RD
WOLCOTT RD
RANGELEY RD
AUDUBON
ROCK STREET
NEW BROOK
DREW RD

INTRODUCTION

In November and December of 1983, a number of meetings took place between representatives of the Newton and Brookline planning and traffic departments, Chestnut Hill Village Associates, other interested citizens, and MAPC. The subject was traffic conditions along the street known as Florence St. in Newton and Heath St. in Brookline (and hereinafter referred to as Florence/Heath St.). Of particular concern to area residents was the anticipated impact on traffic volumes of two new condominium developments on the site of the former Sidney Hill Country Club, and the general increase in traffic along the street. In February 1984 David Jackson, the MAPC representative from Newton, formally requested that MAPC undertake a "traffic study and analysis" of the area, including Route 9 and the Chestnut Hill Mall. Subsequently, the MAPC representative from Brookline, Joan Lamphier, also expressed a desire for an MAPC study, one encompassing Route 9 and Hammond Pond Parkway in the entire Chestnut Hill area.

Ultimately, in order to keep the size of the project manageable, the scope of the study was limited to an analysis of conditions along Florence/Heath St. A work program was proposed to the Subsignatory Committee on Feb. 14, 1984, and approved.

The street segment which is the subject of this study runs through portions of Brookline and Newton. The area has until recently consisted primarily of single-family homes. The Newton census tract which contains Florence St., and which is bounded by Route 9, Parker St., Dedham St., and the Newton City line, has one of the highest median household incomes in the Boston area ($42,043), an average lot size of approximately 3/5 of an acre, and an average of 2.9 persons per household. Florence St. itself, however, is not typical of the census tract as a whole, being isolated by the former Sidney Hill Country Club and being near Route 9 with its high traffic volumes and commercial land uses. The homes along Florence

St. and the local streets which feed into it are more modest than those in the rest of the tract. Many are duplexes. (Median household income figures are not available at the block level.) Heath St. in Brookline serves little residential land. On one side it passes the Holyhood Cemetery, and on the other a mixture of residential land, parking lots, and the rear yards of properties whose only access is onto Route 9. On the eastern end of that portion of Heath St. within the study area there are multi-family dwellings. Between Hammond St. and Tully St., Heath St. is one-way westbound.

Heath St. provides access to the residential neighborhood south of Holyhood Cemetery via Woodland Rd., which intersects Heath St. just east of Hammond Pond Parkway. The Census tract of which the Woodland Rd.-Laurel Rd. neighborhood is a part has a median household income of $28,338; an average lot size of 2/3 acre; and an average household size of 2.7 people.

The area is well served with transportation facilities. Route 9 and Hammond Pond Parkway are major arterials providing access to the east, west and south. Transit service is available at the Chestnut Hill Green Line station and the Chestnut Hill Shopping Center, departure point for the #60 bus to the Back Bay.

While the area consists primarily of single-family homes and duplexes, recently a number of higher density developments have been built. On Florence St., two projects, Hampton Place and The Farm at Chestnut Hill, have received building permits within the past two years. Hampton Place contains 99 units; The Farm 75. In addition, twelve units have been built in Brookline on Heath St. under the name of Heathwood Estates, and a thirty-unit condominium development is currently under construction on Heath St. across from the entrance to the Holyhood Cemetery.

It was the construction of the former three condominium complexes which prompted members of the Chestnut Hill Village Associates to request a traffic study assessing levels of congestion along Florence/Heath St. and proposing measures for relief. One of the purposes of this study is to analyze the extent to which the situation will be made worse by additional residential development.

PROBLEM DEFINITION

In a series of letters to and meetings with Newton and Brookline officials and MAPC, area residents expressed concern over a number of issues associated with traffic along Florence/Heath St. According to an October 21, 1983 letter from Chestnut Hill Village Associates to Newton Alderman Terry Morris, Florence/Heath Street

> serves as a well-known shortcut for drivers traveling east on Route 9 and then south on the Hammond Pond Parkway...During the school year children walk along Heath St. to its intersection with the Hammond Pond Parkway and then must cross the parkway to board a school bus. It is our experience that [Hammond Pond Parkway] is well traveled and at or near capacity during the morning and afternoon peak hours Monday through Friday.

At a subsequent meeting hosted by MAPC and attended by representatives for area residents, developers of The Farm, and the Town of Brookline, concern was also expressed about speeding along Florence/Heath St.

The developers of Hampton Place and The Farm responded to these concerns in traffic impact assessments prepared for the City of Newton.[1] The studies were limited to examining the impacts of the respective developments on traffic conditions. They did not deal with extraneous factors, such as growth in background traffic (the study prepared for The Farm, being the latter of the two, did take into account the traffic which Hampton Place was expected to generate). The studies indicated that as a result of these two developments, the average daily traffic (ADT) on Florence/Heath St. would increase over the 3900 measured in September 1983 by 20.8% to the west of The Farm's access road and 3.6% to the east.

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1. Vanasse/Hangen Associates, Traffic Impact and Access Studies, Route 9 at Florence St. (Hampton Place, October 1981) and The Farm at Chestnut Hill (October 1983).

The differential in projected increase between the two directions was based on the assumption that 85% of the vehicles entering and leaving the two developments would use the section of Florence St. connecting directly with Route 9. On the basis of these projections, the consulting engineers predicted that traffic generated by Hampton Place "will have a minimal effect on the surrounding roadway network" and that "the overall increase in traffic from The Farm will be small."

The following analysis of current and projected traffic conditions on Florence/Heath St. will provide the information necessary to judge the assertions of the developers about the impacts of their projects. Furthermore, an attempt will be made to determine the sources of all traffic along the street, making it possible to evaluate the efficacy of a variety of mitigating measures.

TRAFFIC CONDITIONS

On August 14, 1984, volunteers were stationed to record traffic at five intersections along Florence/Heath St. from Route 9 to Hammond St. Figures 1 through 5 show volume and turning movements counts in the morning and afternoon, respectively.

A number of observations can be made about the data. In the first place, it is clear that most of the traffic passing along Florence/Heath St. from Route 9 to Hammond Pond Parkway is not locally generated, but rather is through traffic using the route as a shortcut or to avoid the Route 9/Hammond Pond Parkway intersection. Of particular interest is the discrepancy between eastbound and westbound volumes. Since access from Florence St. is possible only to Route 9 eastbound, the only drivers who can take advantage of Florence/Heath St. as a shortcut are those headed east. The predominance of eastbound traffic at the intersections of both Route 9 and Hammond Pond Parkway with Florence/Heath St. is testimony to the number of through vehicles.

Vehicles which turn right from Heath St. onto Hammond Pond Parkway southbound are not necessarily the only ones using Heath St. as a shortcut. Drivers may also use Heath St. when they want to get onto Hammond Pond Parkway northbound. The design of the interchange between

FIGURE 1.

Florence St. - Route 9

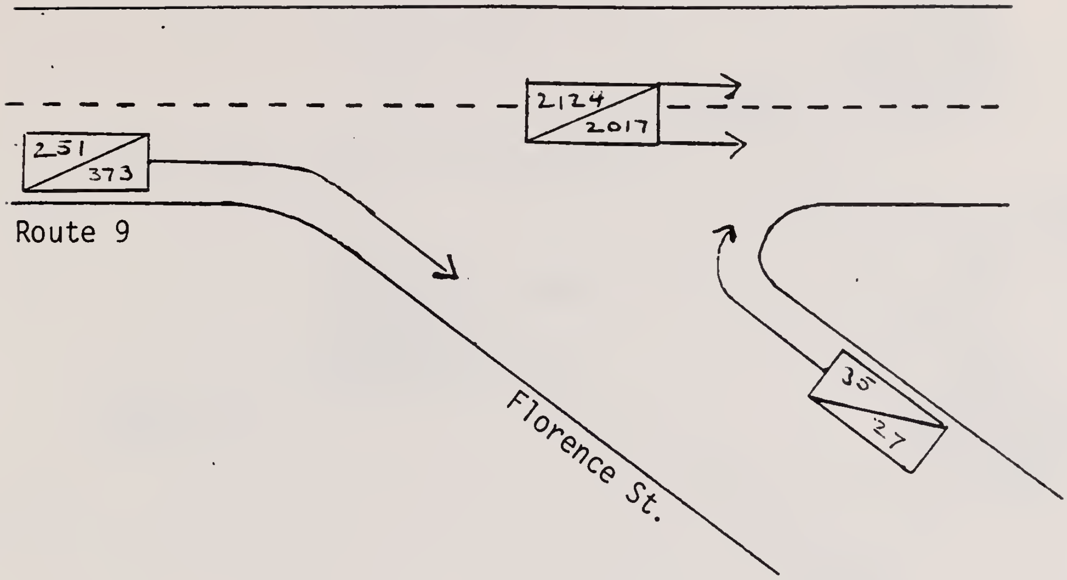


FIGURE 2.

Heath St. - Hammond Pond Parkway

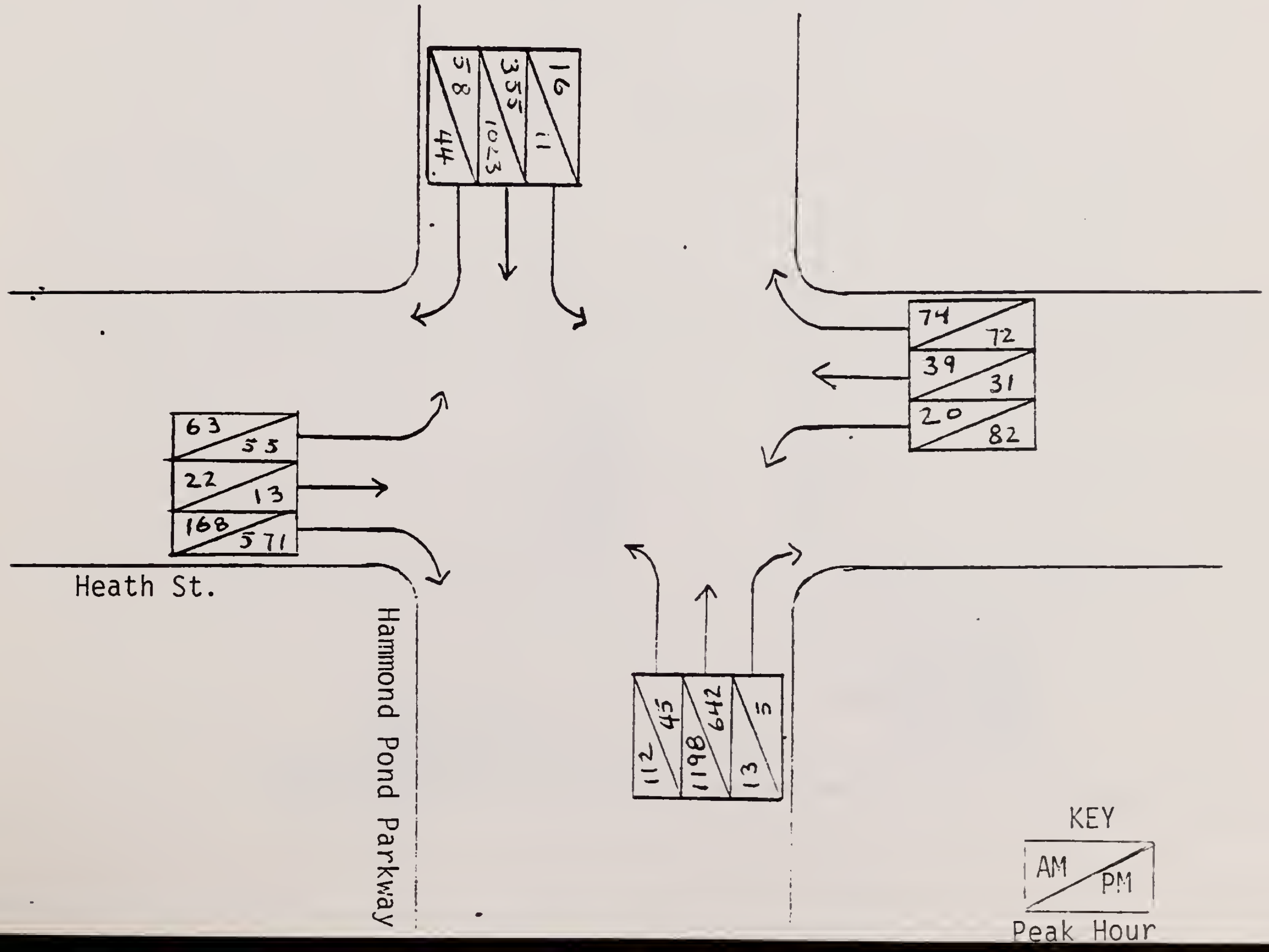


FIGURE 3.

Heath St. - Woodland St.

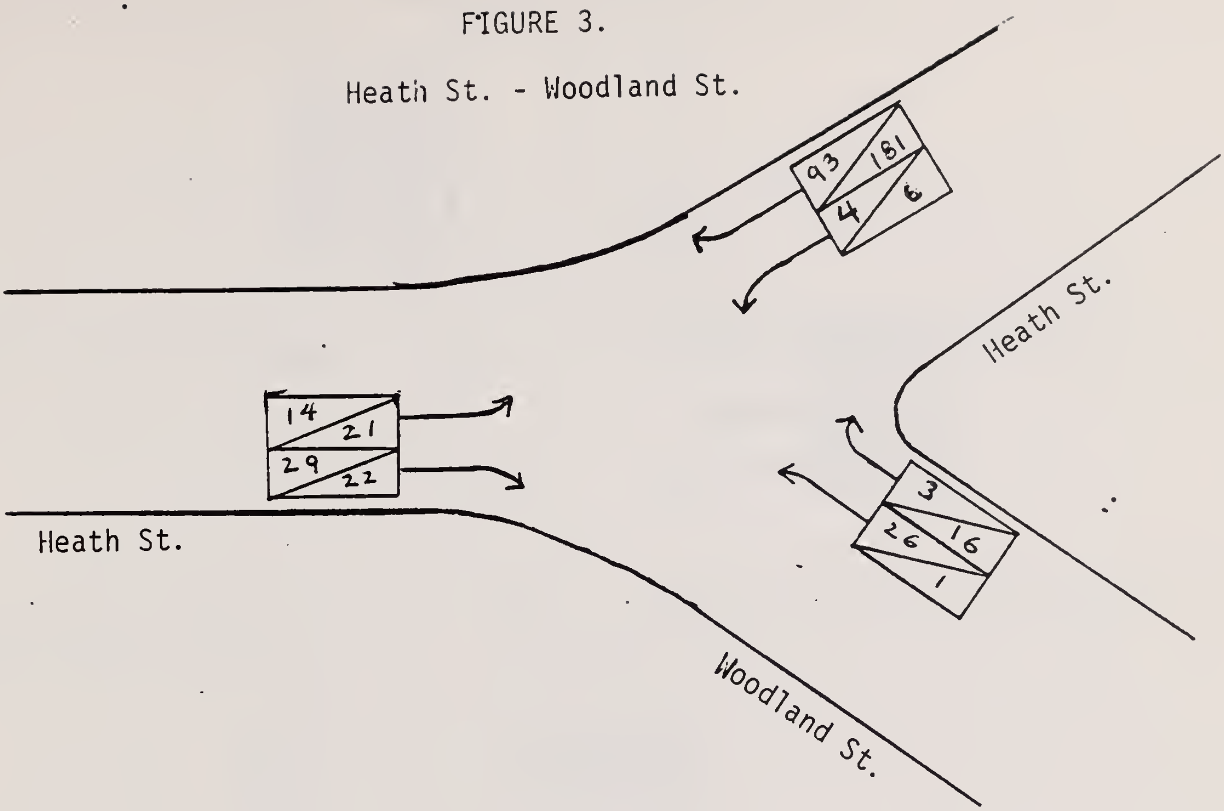


FIGURE 4.

Heath St. - Tully St.

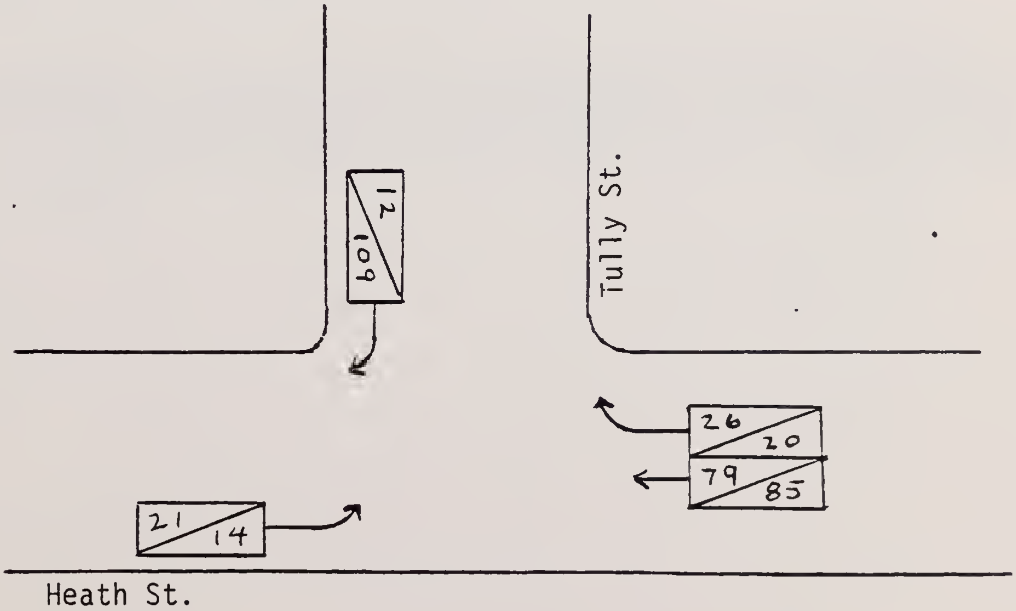
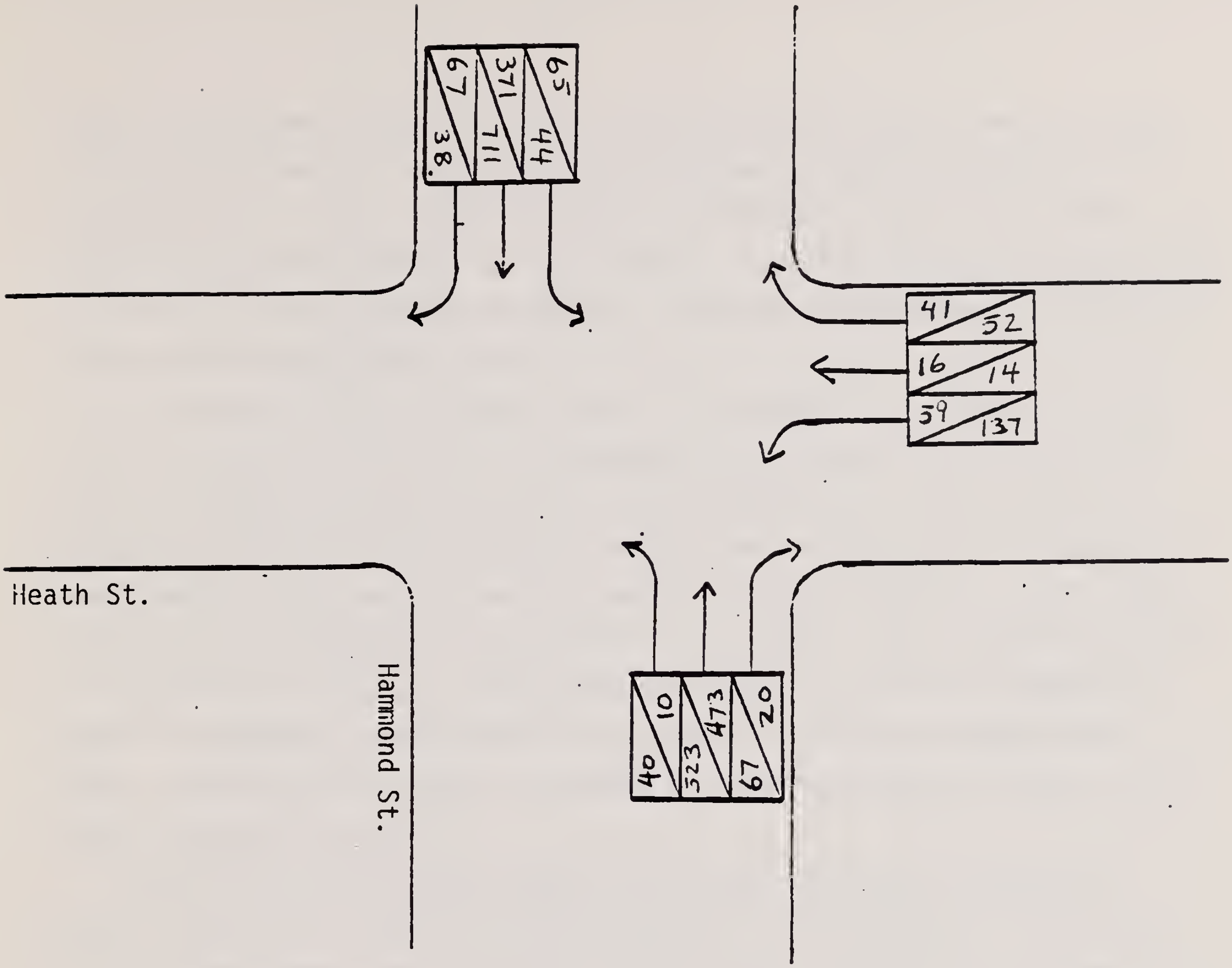


FIGURE 5.

Heath St. - Hammond St.



Counts taken August 14, 1984. Numbers shown represent largest one-hour volume recorded between 7:00 and 9:00 AM and between 4:00 and 6:00 PM at each intersection.

In order to determine if the observed data should be adjusted to reflect seasonal fluctuations in traffic levels, average daily volumes recorded at ten permanent stations within Route 128 were totaled month-by-month for 1983 and compared. As it turns out, August is an almost precisely average month (.02% above average).

Route 9 and Hammond Pond Parkway is such that left turns from the former to the latter require a U-turn around the Hammond Pond Parkway median, a maneuver which at peak hour can be quite difficult. Even though Heath St. represents a slight detour to the south, the inconvenience and delay which the left turn from Route 9 eastbound to Hammond Pond Parkway northbound entails may make drivers avoid it.

The data can also be used to test the assumptions contained in the traffic studies for The Farm and Hampton Place regarding the directional split of traffic originating along Florence/Heath St. Those studies predicted that 85% of the traffic coming from or destined for the new developments would use the western end of Florence/Heath St., while only 15% would go via Hammond Pond Parkway to the east. These assumptions were not based on U.S. Census Journey-to-Work data or any other information about the probable destinations of residents of the new condominiums. Rather, the 85/15 assignment was based on "the importance of Route 9 as a major regional facility."[2]

Actual site distribution data is difficult to obtain, primarily because there is no single traffic generator in the general vicinity of the new developments which produces more than a few trips at the peak hour. In the aggregate, however, certain patterns emerge. For example, in both the AM and PM peak hours, approximately twice as many vehicles turn left from Heath St. eastbound onto Hammond Pond Parkway northbound as turn right from Florence St. westbound onto Route 9 eastbound. The indication is that these proportions reflect the route choice of travelers leaving the Florence/Heath St. area. However, it must be kept in mind that some of the drivers turning left onto Hammond Pond Parkway northbound may not have departed from the Florence/Heath St. area but, as discussed above, may be through travelers who have taken Florence St. to avoid the U-turn at the Route 9-Hammond Pond Parkway interchange. The precise number of these is impossible to determine.

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2. Ibid., The Farm, p. 18.

In a further attempt to clarify the patterns of trip generation and route choice in the area, an observer was stationed at the corner of Louise Road and Florence St. during an afternoon peak hour. Figure 6 details the result of that count.

The count shows, first, that the eastbound route, toward Hammond Pond Parkway, is more popular as an egress from the area than is the westbound route via Route 9. Because the Stop and Shop parking lot has access to Route 9, it is not strictly comparable in terms of site distribution to the sites of The Farm and Hampton Place: drivers leaving from Stop and Shop who wish to go east on Route 9 will more likely go directly out the front drive. So it cannot be said that the ratio of traffic distribution from the new condominium developments will be the same as that observed at the corner of Louise Rd. and Florence St. Still, all the available evidence indicates that the generally preferred route to and from the area of The Farm and Hampton Place is via the Heath St./Hammond Pond Parkway intersection. It appears that the assumption that only 15% of additional vehicles will use this route should be revised upward; a conservative estimate would be in the neighborhood of 60%.

Using this revised assumption, it is possible to get a clearer picture of the proportion between locally generated and through traffic. There are 156 units of housing in the area between Route 9 and Hammond Pond Parkway on Florence/Heath St. (about evenly divided between single family and duplex structures). Although there is no way short of a license-plate survey to determine the origin of the vehicles using Florence/Heath St., it is possible, as a crude measure, to estimate the number of trips generated by the local households and to subtract that number from the total of traffic on the street.

Tables 1 and 2 show the number and direction of trips generated by existing housing in the neighborhood whose streets feed onto Florence/Heath St., and the remainder of the recorded traffic volumes which, it may be supposed, constitute through traffic. Bearing in mind that this is an estimate only, it appears that there is a great deal more through than locally generated traffic.

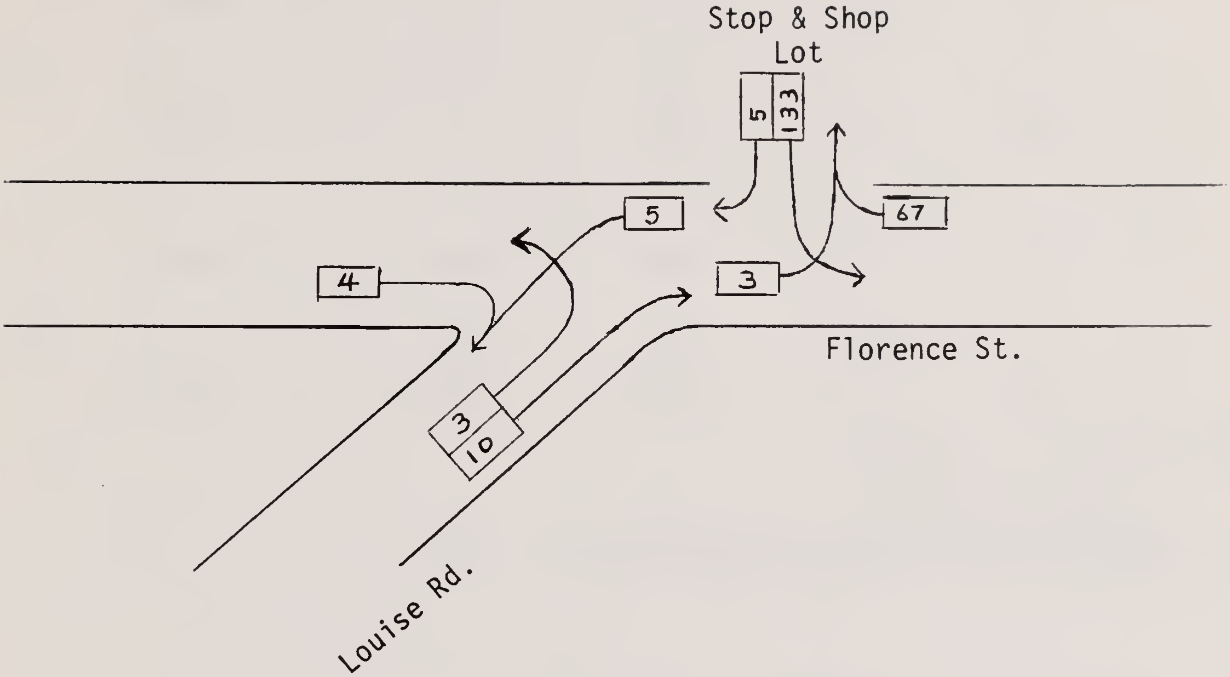


Figure 6.

Traffic Counts, Nov. 27, 1984, 4:30 - 5:50 PM

		Trips Generated*	# Trips, @ 156 du	# Trips toward HPP @ 60%	# Trips toward Rte.9 @ 40%
AM PEAK	Enter	.21	33	20	13
	Exit	.55	86	52	34
	Total	.76	119	71**	48**
PM PEAK	Enter	.63	98	59	39
	Exit	.37	58	35	23
	Total	1.00	156	94	62

*SOURCE: ITE, Trip Generation
** Rounding Error

Table 1. Trip Generation and Site Distribution for Existing Housing in Florence/Heath St. Area

			Current	Locally Generated	Through Traffic
HEATH ST. @ HAMMOND POND PARKWAY	AM	Eastbound	253	52	201
		Westbound	209	20	189
		Total	462	72	390
	PM	Eastbound	439	35	404
		Westbound	120	59	61
		Total	559	94	465
FLORENCE ST. @ RTE. 9	AM	Eastbound	251	13	238
		Westbound	35	34	1
		Total	286	47	239
	PM	Eastbound	373	39	334
		Westbound	27	23	4
		Total	400	62	338

Table 2. Locally Generated vs. Through Traffic

The most heavily used intersection in the study area, Heath St. and Hammond Pond Parkway, has drawn the attention of neighborhood residents who believe it to be congested. A critical movement analysis was performed to test this question. The results were that during the morning peak hour, the intersection currently functions at level of service B (where C is the average), indicating only short delays. During the afternoon peak hour, however, the level of service drops to D, as congestion increases causing longer than average delays.

Further east, at the intersection of Heath St. and Hammond St., the volume of traffic is not so heavy, but nonetheless, there is significant congestion. In particular, critical movement analysis assigns a level of service of E*, signifying failure, to the left turn movement from Heath St. westbound onto Hammond St. southbound. In the AM peak hour this approach is slightly over capacity, but in the PM peak hour the demand for the left turn movement exceeds capacity by over 75%.

The other intersections in the study area are lightly traveled and pose no problems of congestion. The Tully St./Route 9 intersection has been the site of a disproportionate number of accidents over the last five years (see accident table, appendix), possibly due to sight distance problems. Route 9, however, is beyond the purview of this study.

DEVELOPMENT AND TRAFFIC GROWTH

The traffic impact studies produced on behalf of the developers of Hampton Place and The Farm utilized the trip generation rates published by The Institute of Transportation Engineers (ITE) for estimating the amount of traffic which different land uses are likely to produce. While the actual trip generation characteristics of a given land use can vary according to the location of the development and other factors, the ITE rates are averages reflecting a large number of studies. They provide reasonable estimates and are the standard device for predicting traffic impacts of land development.

For the purposes of this portion of the study, the three new developments were considered as a single source. Their impact upon the road segments to the east of Heathwood Estates and to the west of Hampton Place was assessed. This simplification permitted the numbers of vehicles derived from ITE's rates for amount of traffic entering and exiting from a condominium development to be added to the observed directional volumes at the intersections of Florence/Heath St. with Route 9 and Hammond Pond Parkway. Table 3 shows the number of trips generated by the new developments, by day and by peak hour, in terms of entrances and exits.

In addition to calculating the number of trips likely to be produced by the condominium complexes under construction along Florence/Heath St., it is also necessary to consider the growth in general, area-wide traffic volumes as time passes. Estimating the probable amount of this background growth is difficult, uncertain, and not supported by any authoritative study of traffic growth trends in the metropolitan region. The projection conventionally used in Massachusetts is 2% increase per year in total volumes. This figure is based on past increases in the numbers of vehicle registrations and licenses issued. An analysis of traffic volumes recorded by the Massachusetts Department of Public Works over the past five years in the MAPC region confirms the reasonableness of this estimate. Scattered observations over a period of three years along Florence/Heath St., however, suggest a higher annual growth rate. Therefore, the background traffic growth was projected using two rates: a low estimate of 2% and a high estimate of 4%. Table 4 shows the projected change in traffic volumes at the intersections of Florence St. with Route 9 and Heath St. with Hammond Pond Parkway as a result of both local development and background traffic growth over the next five years.

		Daily	AM			PM		
	Dwelling Units	# trips @ 5.2/du	enter .065/du	exit .345/du	total .41/du	enter .343/du	exit .167/du	total .51/du
The Farm	75	390	5	26	31	26	13	38
Hampton Place	99	515	6	34	41*	34	17	50*
Heathwood Estates	12	62	1	4	5	4	2	6
Total	186	967	12	64	77	64	31*	95*

*rounding error

TABLE 3. Trips Generated by Condominium Complexes on Florence/Heath St.

AUTO TRIPS

			CURRENT	NEW DEVEL-OPMENT	CHANGE	GROWTH, 1985-1990: @2% @ 4%	TOTAL, 1990: @2% @ 4%	CHANGE, 1985-1990: @2% @ 4%
Heath St. at Hammond and Parkway	AM peak	east-bound	253	39	15%	26 55	318 347	26% 37%
		west-bound	209	7	3%	22 45	238 261	14% 25%
		total	462	46	10%	48 100	556 608	20% 32%
	PM peak	east-bound	439	18	4%	46 95	503 552	15% 26%
		west-bound	120	38	32%	12 26	170 184	42% 53
		total	559	56	10%	58 121	673 736	20% 32%
Florence St. at Route 9	AM peak	east-bound	251	5	2%	26 54	282 310	12% 24%
		west-bound	35	26	74%	4 18	65 69	86% 97%
		total	286	31	11%	30 62	347 374	21% 33%
	PM peak	east-bound	373	26	7%	39 81	438 480	17% 29%
		west-bound	27	12	44%	3 6	42 45	55% 67%
		total	400	38	10%	42 87	480 525	20% 31%

In terms of two-way volumes, the three new condominium complexes together will increase the number of vehicles using Florence/Heath St. by about 10% over current levels. The impact of new traffic, however, will not be uniform with respect to direction. At the Heath St.- Hammond Pond Parkway intersection, for instance, most of the new traffic generated by the developments in the morning rush hour will, not surprisingly, be headed east. This direction is already more congested than the westbound. In the afternoon, however, the flow of vehicles returning to the condominium complexes through the Heath St.- Hammond Pond Parkway intersection will use the lightly traveled westbound lane, which will remain congestion-free.

If traffic grows at a rate of only 2% per year, by 1990 the increase attributable to background growth will be slightly over 10%. If, on the other hand, the background growth is 4% per year, in five years the increase attributable to background growth will be almost 22%. Counting both background growth and the traffic generated by the new condominium complexes, the increase in traffic volumes at the Heath St. - Hammond Pond Parkway intersection will be between 20% and 38% by 1990. The range of projected increases is appoximately the same at the other end of Florence/Heath St., near its intersection with Route 9.

When a critical movement analysis is performed for the Heath St. - Hammond Pond Parkway intersection using the traffic volumes projected for 1990, it becomes apparent that the area faces the prospect of increasingly severe congestion. Even under the more conservative prediction, that background traffic will increase at a rate of 2% per year, the level of service during the PM peak hour would drop to E, indicating traffic volumes approaching capacity and very long traffic delays. If, on the other hand, traffic increases by 4% annually, the intersection will exceed capacity in the afternoon peak hour, and long delays will occur in the morning as well.

ANALYSIS

The preceding discussion of present and future traffic conditions in the study area has revealed and focussed upon two outstanding problem locations: Florence/Heath St. from Route 9 to Hammond Pond Parkway and the intersection of Heath St. and Hammond St.

Florence/Heath St.

The construction of Heathwood Estates, Hampton Place and The Farm will have a considerable effect on traffic levels along Florence/Heath St., adding about 10% to present volumes. But the traffic problems along Florence/Heath St. stem less from the land uses it serves than from characteristics of its design and its relation to two adjoining major arterials, Route 9 and Hammond Pond Parkway. In its design, Florence/Heath St. resembles a collector street, similar, for example, to Brookline St. in Newton. The function of a collector street is to provide access between residential neighborhoods and the network of regional roads. Thus collector streets lie midway on the hierarchy of street types between local streets and arterials.

Florence/Heath St. does provide access to Route 9 and Hammond Pond Parkway from Louise Road and Tanglewood Road, two local residential streets. Only approximately 156 dwelling units abut the streets which feed into florence/Heath St., however, compared to the 300 to 400 served by a typical collector street. Also, whereas the ideal collector street runs between a residential neighborhood and an arterial, and serves no through traffic, Florence/Heath St. runs directly from Route 9 to Hammond Pond Parkway in a distance of less that three quarters of a mile. Drivers on Route 9 eastbound who intend to take Hammond Pond Parkway south are likely to see Florence/Heath St. as a shortcut. The result is that Florence/Heath St. serves less as a collector street than as an adjunct to the two major arterials.

The design of the intersection of Route 9 and Florence St. contributes to the tendency of Florence/Heath St. to attract through traffic. Florence St. intersects Route 9 at a 45 degree angle, enabling drivers to turn onto it without slowing much. Furthermore, due to the angled intersection and the widening of Florence St. at the approach to the intersection, the curb cut of Route 9 at the intersection is over 100 feet wide. This width makes Florence St. appear almost as a highway exit ramp, encouraging through traffic to use it.

There are also a number of reasons why eastbound Route 9 drivers may use Florence St. which relate to route choice. First, for those going to Hammond Pond Parkway south, Florence/Heath St. is an obvious shortcut, albeit one which saves less than a quarter of a mile. Secondly, as discussed above, for those going to Hammond Pond Parkway north the Heath St. - Hammond Pond Parkway intersection may present an easier left turn than the Route 9 - Hammond Pond Parkway interchange. Finally, for those going either north or south, Florence/Heath St. may seem to have less congestion than the segment of Route 9 between Florence St. and Hammond Pond Parkway, because the latter has many curb cuts, causing the "friction" of cars entering and exiting the right lane.

Contributing to the flow of traffic eastbound on Florence/Heath St., at least in the afternoon when congestion is most severe, are the vehicles which exit from the Stop and Shop parking lot. Although the counts were taken on two different days, a comparison of the 133 cars leaving the lot and heading east on Florence/Heath St. with the 439 total recorded at the eastbound approach of Heath St. at Hammond Pond Parkway suggests the magnitude of this influence.

Heath St. - Hammond St.

As discussed above, the intersection of Hammond St. and Heath St. currently suffers severe congestion of the Heath St. westbound approach, due to the difficulty of making left turns onto Hammond St. south. In theory, it is only those left turners who will experience lengthy delays in clearing the intersection. In reality, however, the entire intersection, particularly the northbound approach on Hammond St., is congested, due to the proximity, less than 300 feet away, of the major intersection of Route 9 and Hammond St. This latter intersection, which is signalized, creates queues which extend often as far as Heath St. and considerably hinder the functioning of the Heath/Hammond intersection.

The problem is exacerbated, especially in the morning rush hour, by the queues which develop at the entrance to the automobile repair shop on the southeast corner of Heath and Hammond Sts. Field observers noted the tendency of cars waiting to enter the shop's garage to block entirely the westbound egress of Heath St. away from the intersection.

POTENTIAL SOLUTIONS

The site visits, analysis of traffic and turning movement counts, review of available data, and comments of local officials and concerned citizens which form the basis of this study suggest a number of measures which would help avert the traffic problems threatening the study area. In such a brief study as this, MAPC cannot recommend a single course of action. A measure or combination of measures will have to be selected by the Town of Brookline, the City of Newton, the MDC, and the MDPW, on the basis of engineering considerations, the needs and desires of area residents, and the exigencies and opportunities created by planned development at Florence St. and Route 9. A number of design or traffic operations changes are presented below in terms of their advantages and disadvantages.

On reviewing a draft of this report, the Chestnut Hill Village

Associates suggested a variation on two of the measures. Their recommendation is included as Appendix B, along with MAPC comments.

Heath St. - Hammond St. intersection.

The only recommendation with regard to this intersection is that it be signalized. While the limited data gathered in the preparation of this report do not indicate that any of the Institute of Transportation Engineers' warrants for signalization are met, the proximity of the intersection to the Route 9 - Hammond St. intersection constitutes a special case. A signal would solve two problems: it would allow time for left turns from Heath St. westbound to Hammond St. southbound, and, if it were coordinated with the Route 9 - Hammond St. signal, it would prevent the latter's queues from backing up across Heath St.

Florence/Heath St.

1) Redesign Florence St. - Route 9 intersection.

The present alignment of this intersection, as noted above, encourages use of Florence/Heath St. as a shortcut from Route 9 east to Hammond Pond Parkway. With the great width of the Florence St. curb cut on Route 9, and the forty-five degree diagonal of its approach, the intersection looks more like an exit ramp from Route 9 than a collector street. Drivers respond to the visual cues which roadway design presents. In the context of Route 9, an intersection such as this one conveys a message inviting drivers to use it. However, the actual time savings attainable by going this way is only about ten seconds. It is likely, therefore, that demand for the shortcut is quite elastic, with respect both to time and to design-related factors such as the alignment of the intersection.

Consideration should be given to redesigning the intersection so that Florence St. approaches Route 9 at a standard ninety degree angle, and its throat is narrowed from over 100 feet to less than fifty. The decreased prominence of Florence St. as a result of these changes would prompt Route 9 motorists to pass by and use the Hammond Pond Parkway interchange as they should. The effect of such a redesign on the safety of eastbound Route 9 traffic is discussed below.

If a realignment is implemented, the message that drivers are discouraged from using Florence/Heath St. as a shortcut could be reinforced with signs stating "Hammond Pond Parkway traffic exit 1/4 mile."

An ancillary benefit of realigning the intersection would be a safer turning movement from Florence St. onto Route 9 east. Whereas at present drivers must turn an acute angle from northwest to east, after realignment a standard ninety degree, north-to-east turn would be possible.

Now is a propitious time to make plans for rectifying this intersection's deficiencies. The site of Valle's restaurant has been sold to a developer who intends to construct a major office-retail complex there. Furthermore, there is a considerable amount of land on the other side of Florence St. which is ripe for development. That land is currently zoned for duplexes. Given, first, that a complete redevelopment of the Valle's site is currently in the design stage, and, second, that any rezoning of the land across Florence St. would entail special permits, the City of Newton has an opportunity to effect the improvement of the intersection at a relatively low cost and even, perhaps, with the aid of the abutting landowners.

Disadvantages. a) Realignment of the intersection would mean that those drivers who still did turn right onto Florence St. would be forced to slow considerably before turning. Their presence would contribute to congestion on Route 9, and might increase the probability of rear-end collisions.

The inclusion of a deceleration lane on Route 9 before the intersection would solve this problem. Engineering studies will be necessary to determine if land is available in the public right-of-way for such a feature, and to address the impact of realignment upon Route 9 and its interchange with Hammond Pond Parkway.

b) There is no guarantee of the efficacy of realigning the intersection. No quantifiable parameter of the intersection's function would be changed, except for a turn delay of a few seconds. No modeling device exists which will show how many vehicles would be diverted from using Florence/Heath St. for a shortcut as a result of making its intersection with Route 9 less inviting. Furthermore, the success of the measure would depend to some extent on subtle design elements such as the wording and placement of signs directing drivers to use the Route 9 - Hammond Pond Parkway interchange. Around 90% of the traffic on Florence/Heath is not locally generated, and so is potentially divertable. But there is no way of knowing what portion would respond to a change in the symbolic instructions of the intersection.

2) Close access from Stop & Shop parking lot to Florence St.

This measure would be effective in sharply decreasing the amount of traffic traveling along Florence/Heath St. The rear lot would still be accessible from Route 9 via the front lot. All the traffic currently generated by the shopping center onto Florence St. would be redirected onto Route 9. Congestion at the Heath St. - Hammond Pond Parkway intersection would markedly decrease, at least in the PM peak hour.

Disadvantages. a) A negative impact on the flow of vehicles within the Stop & Shop lot.

b) Increasing friction of entering and exiting vehicles on Route 9.

c) Legal difficulties in taking away from the shopping center access to Florence St.

d) Necessity of keeping open Hammell Place, which shares access to Florence St. with the Stop & Shop driveway.

3) Install speed humps along Florence/Heath St.

Speed humps are not to be confused with the speed bumps commonly used in parking lots to restrict vehicle speeds. Speed humps are a more gentle form of raised surface designed to cause no discomfort or shock when crossed at legal speeds, but to cause "increasing levels of discomfort depending on the amount that the design speed is exceeded."[3] The dimensions of a speed hump can be adjusted according to the speed limit which is to be enforced. In published experiments, humps were used which were between three and four inches high, two lanes wide and about twelve feet long. The spacing of humps, usually from 230 to 800 feet apart, also influences their effectiveness.

Speed humps have been installed in locations around the country, primarily in California, and have been shown to be quite successful in lowering average vehicle speeds.

The installation of speed humps would not directly address the problem of increasing traffic volumes along Florence/Heath St., only the problem of speeding by those who use the street as a shortcut. Speed humps are enforcement devices only; hence the nickname "sleeping policeman." Still, if speeds are compelled toward the legal limit, some drivers may find the shortcut less attractive than previously, and may return to using Route 9 and the Hammond Pond Parkway interchange.

Disadvantages. The problems with speed humps are mostly legal and institutional. Despite tests showing that properly proportioned speed humps do not cause a loss of vehicle stability even at excessive speeds,

3. J.P.Clement, "Speed Humps and the Thousand Oaks Experience," Sept. 1982, City of Thousand Oaks Department of Public Works; see also ITE Journal, Jan. 1983.

many engineers are unwilling to consider their installation on the grounds that no traffic design element should cause a hazard. This attitude is reinforced by the legal liability of a municipality for the safety of the traffic control devices it installs.

After the Federal Highway Administration agreed to assume liability, the City of Boston in 1984 installed speed humps in two locations. A trial period and evaluation indicated that speed humps are a promising low-cost speed control measure. Boston is now in the process of establishing a set of guidelines for future use.

4) Widening of Route 9.

It has been suggested that a reason for the popularity of Florence/Heath St. as a shortcut is that the numerous curb cuts between Florence St. and Hammond Pond Parkway on Route 9, and the many vehicles using them, cause delays along that segment. If the State were to widen the segment by adding a turning lane on the right, this friction would diminish. Presumably, then, the segment would be less impeded and would attract more traffic from Florence/Heath St.

Disadvantages. The cost of this measure would be much higher than that, for instance, of measure 1) and its effect on traffic along Florence/Heath St. much less direct or predictable.

5) Reconstruct Hammond Pond Parkway - Route 9 interchange.

If the intersection of Hammond Pond Parkway and Route 9 were redesigned as a standard, signalized diamond interchange, the awkward left turn maneuver presently necessary would be simplified. This change would make it less likely that drivers headed for Hammond Pond Parkway north would take Florence/Heath St. to avoid the interchange.

Disadvantages. The turning movement counts make it clear that vehicles turning left from Heath St. east onto Hammond Pond Parkway north are not a major factor in congestion at the intersection. In the PM peak hour the number of vehicles turning right from Heath St east is ten times greater than the number turning left. Even if a redesign of the Route 9 - Hammond Pond Parkway interchange resulted in more than half the left turning vehicles disappearing from the Heath St. - Hammond Pond Parkway intersection, the change in critical lane volume would not be enough to cause a change in the level of service. Therefore the reconstruction of the Route 9 - Hammond Pond Parkway interchange is not likely to remedy traffic problems along Florence/Heath St. This is not to say, however, that it is not desirable for other reasons.

6) Make Florence St. one-way westbound, west of the Stop & Shop entrance.

If Florence St. were designated one-way westbound at its western end, no through traffic would be permitted from Route 9 to Hammond Pond Parkway via Florence/Heath St. Traffic volumes at the eastbound approach to the Heath St. - Hammond Pond Parkway intersection would be reduced dramatically. The primary source of traffic eastbound on Florence/Heath St. would be the Stop & Shop parking lot.

Although this measure is one of traffic regulation, a considerable amount of physical restructuring would be necessary. The changes would be similar to those envisioned in measure 1). To accommodate and protect one-way traffic, the intersection of Route 9 and Florence St. should be realigned to 90 degrees and the Florence St. approach should be narrowed severely.

Disadvantages. a) In keeping local as well as through traffic from using Florence St. eastbound, this measure could be seen as throwing out the baby with the bath. Local residents as well as others will be forced to

turn south onto Hammond Pond Parkway instead of using Florence St. For example, residents of Louise Road coming home from the west on Route 9 would, under this plan, be forced to go about a mile out of their way.

b) The cumulative effect of the detour required of area residents and visitors would be an increase in traffic southbound on Hammond Pond Parkway between Route 9 and Heath St., and westbound on Heath St. A more serious ramification would be the use of the Stop & Shop parking lot as a shortcut from Route 9 to Florence St.

7) Re-time the signal at Heath St. - Hammond Pond Parkway.

If drivers are using the Florence/Heath St. shortcut because it saves them time, the best way to discourage them is to eliminate the time advantage. One way to do this would be to re-time the signal at the intersection of Heath St. and Hammond Pond Parkway so that the Heath St. eastbound approach's red phase is longer. Theoretically, if there is now a ten-second advantage in using Florence/Heath St., making drivers wait at the light eleven seconds longer will eliminate the through traffic. This would be a very low-cost measure, involving no capital expenditure and relatively little labor.

Disadvantages. a) Lengthening the red phase on Heath St. would encourage violation of the No-Right-Turn-On-Red regulation. Unless the regulation were strictly enforced, significant numbers of violations would diminish the effectiveness of the measure in discouraging drivers from using Florence/Heath St.

b) If the measure were effective, the result would be worsened congestion on Heath St., which would be counterproductive to the aims of these proposed improvements.

CONCLUSIONS

In their review of a draft of this report, interested area residents indicated a strong preference for measure 1) above. However, they were not presented at that time with measures 6) and 7) and so had no opportunity to comment on them. In particular regard to measure 6) involving the designation of Florence St. as one-way westbound, the attitude of affected residents is important. Planning and traffic officials of the City of Newton and Town of Brookline should confer with local residents as well as with representatives of the MDC and MDPW. Various combinations of the measures presented above should be considered, and, if necessary, engineering studies should be performed to determine the practicality and cost of different approaches to the problem. A plan should be approved by all the interested parties as soon as possible, to take advantage of the proposed redevelopment of the Valle's site and the expected development of sites across Florence St.

APPENDIX A : Accident Summary

SITE	#ACCIDENTS, 1978-80	# @ PEAK HR. (7-10, 4-6)	# INVOLVING PARKED CARS	WEATHER: ICY/SNOW
Florence St.	15	1	5	1
@ Rte. 9	16	3	3	2
Heath St.	48	11	5	3
@ Hammond Pond Pkwy.	32	13	2	2
@ Hammond St.	41	20	2	2
Hammond Pond Pkwy/ Rte. 9	129	34	8	12
Hammond St./ Rte. 9	156	57	14	5
Tully St/Rte.9	15	1	14	4

SOURCE: Mass. Department of Public Works, Traffic Engineering Section, Traffic Accident Report

APPENDIX B: Comments on Draft Report by Chestnut Hill Village Associates

ADDENDUM

Revision and recombination of recommendations #2 and #4

It is the opinion of the Chestnut Hill Village Associates' Review Committee that closing access completely to the Stop and Shop parking lot from Florence Street would be practically and politically unfeasible. However, the Committee recommends that it could be a feasible solution to allow access to, but not egress from this part of the Stop and Shop parking lot, if a partial widening of Route 9 in front of the Stop and Shop parking lot were to occur enabling a better, safer exit from the lot to Route 9.

In brief, we propose that MAPC re-examine the possibility of widening only a portion of Route 9 on the eastbound side adjacent to the Stop and Shop parking lot. The widening would necessitate taking a portion of the Stop and Shop parking lot area abutting Route 9. This should not be a hardship to Stop and Shop as there is plenty of additional parking at the side and rear of the shopping center. In addition, the current exit to Route 9 from the parking lot should be changed. The current exit should be closed off and a new exit near the present entrance, but separated by a divider, should be designed and installed. This would eliminate some of the weave merge problems occuring at the present exit which not only make it difficult for cars to exit from the parking lot, but also discourage cars on Route 9 from using the exit ramp to the Hammond Pond Parkway. See figures 1 and 2 below:

Figure 1

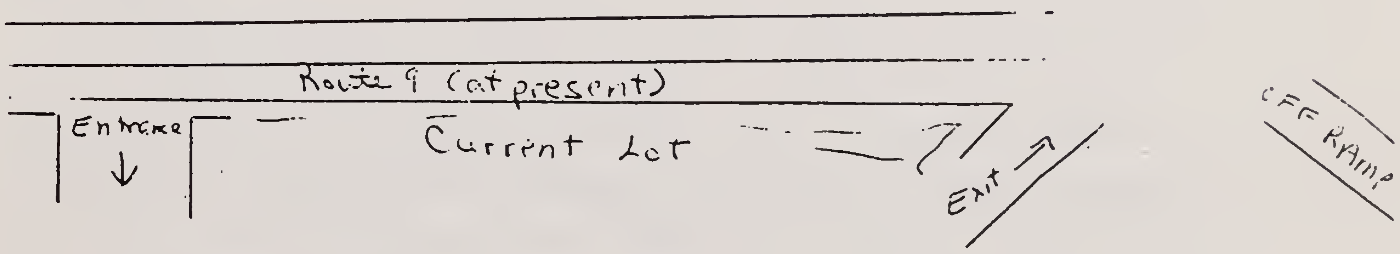
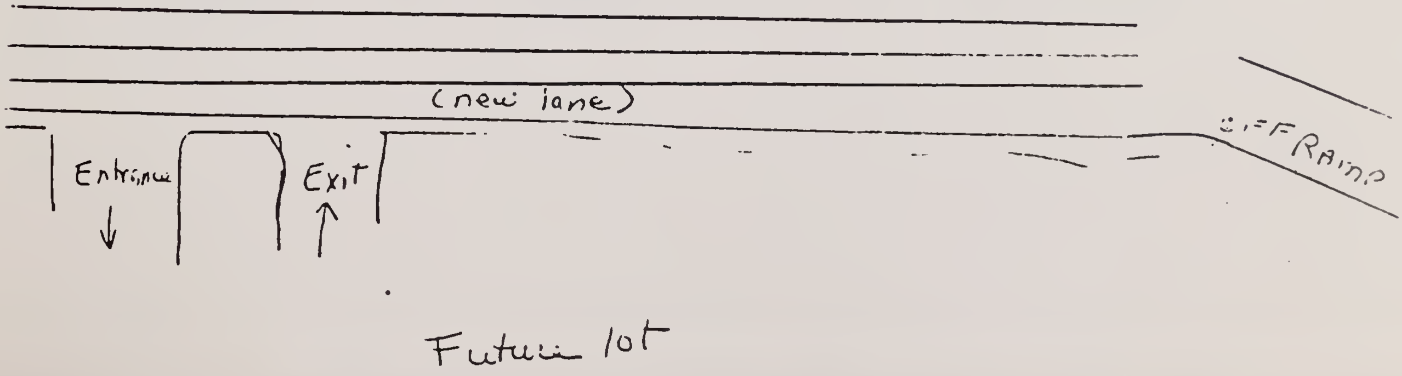


Figure 2



MAPC Comment on the Chestnut Hill Village Associates (CHVA) addendum

The CHVA's proposal to combine aspects of two possible approaches to the Florence/Heath St., congestion problem is reasonable in most respects. It has two obstacles to implementation which should be noted; both, however, can perhaps be overcome.

The first obstacle is mentioned in the report (p.16): namely, that widening Route 9 is an expensive proposition which the State may be reluctant to undertake solely for the purpose of alleviating the problems at the Heath St./Hammond Pond Parkway intersection. The project might be justifiable on other grounds, however, for example to prevent accidents on Route 9 itself. The accident reports of the MDPW's Bureau of Traffic Operations do not specify clearly or exactly the number of accidents that have taken place at the driveways from the Stop and Shop parking lot on Route 9, but they indicate at least 32 accidents occurring on Route 9 in this vicinity between 1978 and 1980. The addition of an entering and exiting lane as suggested would make the section of Route 9 eastbound immediately west of the Hammond Pond Parkway ramps less prone to accidents.

Even if Route 9 were not widened, the relocation of the parking lot's driveway to the west, as indicated in CHVA's diagram, would be a safety improvement.

The second obstacle to implementing CHVA's proposal is that to limit the rear Stop and Shop parking lot driveway to entrance use only would require more than just erecting a "No Exit" sign. It would be necessary, in addition, to channelize the driveway with curbing in order to separate parking lot traffic, which would be allowed only to enter, from traffic to and from the homes on Hammell Place, a short private way which now shares a curb cut with the parking lot. Enforcement would also be a problem. It might be necessary to install a mechanical device which allows only one way traffic.